

# Measurement of quality of life of vitiligo using disease-specific indicator and its association with area severity score

*Medição da qualidade de vida do vitiligo usando indicador específico da doença e sua associação com o escore de gravidade da área*

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## Abstract

**Background:** Vitiligo is regarded as a psychosocial disorder for which assessment of disease severity is imperative to aid the management of disease. The association between demographic parameters, vitiligo severity, and quality of life (QoL) scores aids in gauging the impact of disease severity on QoL. **Objectives:** The aim of the study was to measure the QoL of vitiligo patients using vitiligo QoL (VitiQoL) index questionnaire and to assess its correlation with clinicodemographic patterns and vitiligo area severity index vitiligo area scoring index (VASI). **Methods:** One hundred and eight patients of vitiligo were included in this cross-sectional study. The disease severity was calculated using VASI score and patients were asked to fill the VitiQoL questionnaire (after translation to local language) for assessing the QOL. Demography, area severity, and QOL were statistically analyzed for demonstrating the correlation. **Results:** Statistically significant strong correlation was demonstrated between VitiQoL and VASI scores ( $p = 0.001$ ;  $r = 0.856$ ). In addition, female gender, young adults, lesions on exposed sites, and divorced status demonstrated significantly higher impact on the QOL than others ( $p < 0.05$ ). **Conclusion:** QOL is significantly dependent on the disease severity and certain demographic patterns which reiterates the importance of measuring burden of vitiligo as a part of its multifaceted management.

**Keywords:** Vitiligo. VitiQoL. VASI. Quality of life.

## Resumo

**Introdução:** O vitiligo é considerado um distúrbio psicossocial para o qual a avaliação da gravidade da doença é imperativa para auxiliar no manejo da doença. A associação entre parâmetros demográficos, gravidade do vitiligo e escores de qualidade de vida (QV) auxilia na mensuração do impacto da gravidade da doença na QV. **Objetivos:** Medir a QV de pacientes com vitiligo por meio do questionário vitiligo quality of life (VitiQoL) index e avaliar sua correlação com padrões clínico-demográficos e índice de gravidade da área de vitiligo (VASI). **Métodos:** 108 pacientes com vitiligo foram incluídos neste estudo transversal. A gravidade da doença foi calculada usando o escore VASI e os pacientes foram solicitados a preencher o questionário VitiQoL (após tradução para o idioma local) para avaliar a QV. Demografia, gravidade da área e QV foram analisadas estatisticamente para demonstrar a correlação. **Resultados:** Foi demonstrada forte correlação estatisticamente significativa entre os escores VitiQoL e VASI ( $p = 0.001$ ;  $r = 0.856$ ). Além disso, sexo feminino, adultos jovens, lesões em locais expostos e estado divorciado demonstraram impacto significativamente maior na QV do que outros (valor de  $p < 0.05$ ).

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**Conclusão:** A QV depende significativamente da gravidade da doença e de certos padrões demográficos, o que reitera a importância de medir a carga do vitiligo como parte do seu tratamento multifacetado.

**Palavras-chave:** Vitiligo. VitiQoL. VASI. Qualidade de vida.

## Introduction

Vitiligo is a common disorder of pigmentation that can occur at any age and affects both genders nearly equally<sup>1</sup>. It is a multifactorial disorder having a complex pathogenesis for which multiple theories have been put forward, out of which the autoimmune theory is the most widely accepted<sup>2</sup>. Vitiligo can be classified as generalized, localized, segmental, or non-segmental. Rare clinical variants include trichrome, quadrichrome, pentachrome, red, and blue vitiligo<sup>3</sup>. The disease is usually slow and progressive having relapsing and remitting course along with exacerbations that might correlate with triggering events such as trauma (Koebner's phenomenon). Treatment of vitiligo remains challenging for a dermatologist despite the availability of various therapeutic modalities which makes it a cause of great psychosocial stress to the patients<sup>4,5</sup>.

It is important to assess the severity of disease as it affects the psychological well-being of patients. The vitiligo area scoring index (VASI) is a quantitative score that uses hand units to quantify the proportion of vitiligo involvement<sup>6</sup>. Previously, there was no specialized quality of life (QOL) evaluation instrument for vitiligo; hence, it was assessed using non-disease specific scores<sup>7-10</sup>. Lately, evidence correlating vitiligo to various psychological issues proves it to be more of a psychosocial disorder affecting QOL, than merely a cosmetic concern<sup>8,9,11,12</sup>. Hence, a vitiligo-specific tool, vitiligo quality of life (VitiQoL), was developed<sup>13</sup>. It is an objective, vitiligo-specific assessment of disease state, burden, and treatment result for patients that is supported by disease-specific items derived from thorough open-ended patient interviews, clinician input, and a literature review<sup>14</sup>.

In this study, we have attempted to use the vitiligo-specific questionnaire (VitiQoL) to sight impact of the disease on QOL among patients with diverse demographics.

## Methods

The study was initiated after obtaining ethical clearance from the ethics committee of the institute. A total of 108 patients of vitiligo attending the department of dermatology in a tertiary care hospital were included in

this cross-sectional, questionnaire-based study after obtaining informed consent. The study was conducted over a period of 2 years. The study population included clinically diagnosed cases of vitiligo above the age of 18 years. Dermoscopy was used to confirm the clinical diagnosis of the patients. Patients with other disorders and disabilities associated with social stigma were excluded from the study. A detailed history including the name, age, gender, marital status, occupation, duration, onset, progression, treatment history, and other relevant data was recorded. Thorough assessment covered skin type, region of involvement, and vitiligo type (acrofacial, segmental, focal, or universal). The severity of illness was determined by VASI scoring, and its relationship with VitiQoL scores was evaluated.

## Study measurement tools

VASI score is a quantitative score used for the evaluation of the severity of vitiligo. The degree of residual depigmentation is expressed as: the depigmented area surpasses the pigmented area at 100% depigmentation; at 50% depigmentation, the depigmented and pigmented regions are equal; at 25% depigmentation, the pigmented area exceeds the depigmented area; and at 10% depigmentation, just specks of depigmentation are present<sup>6</sup>. VASI of each body site (hands, upper extremities, trunk, lower extremities, and feet) is calculated and then, cumulative body VASI is calculated using the following formula (range of 0-100):

$$VASI = \sum (\text{all body sites}) (\text{hand units}) \times (\text{residual depigmentation}).$$

VitiQoL, proposed in 2013 by Lilly et al., is a disease-specific score used to measure concerns specific to the disease over a period of last month. It is based on three factors, namely, stigma, participation limitation, and behavior<sup>14</sup>. The score comprises 15 questions with a Likert scale of seven points (0-6) in which the total scores range from 0 to 90. Higher scores indicate a poorer QOL.

The English version of the VitiQoL questionnaire was translated into Punjabi language by a bilingual dermatologist. Backward translation of this questionnaire was done by another bilingual dermatologist and reviewed by the previous translator to ensure that

the questions conveyed the same meaning. The content validity of both the forward and backward translations was discussed by two evaluators who were experts in vitiligo and were also bilingual (fluent in English and also native Punjabi speakers). No questions were added or removed from the original version and score ratings also remained the same in the Punjabi version. Patients were then asked to fill the translated questionnaire for the assessment of the QOL. The Punjabi version of VitiQoL has been attached as a supplementary file.

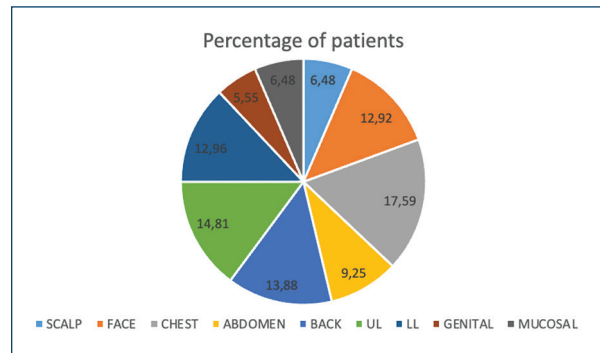
### Statistical analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA for Windows) version 26 software. Numbers and percentages were used to describe qualitative data. Descriptive statistics, mean, and standard deviation were calculated for the quantitative data. Pearson correlation coefficient was used for the assessment of the correlation between QOL score, that is, VitiQoL, and vitiligo severity score, that is, VASI. Independent t-test and analysis of variance (ANOVA) test was used for comparison of the demographic profile. Probability value  $p < 0.05$  was considered as significant.

### Results

The study enrolled 108 patients (53 females and 55 males), with a mean age of  $39.89 \pm 14.37$  years. The disease was most commonly observed in the age group of 40-49 years (36.72%) with mean duration of 2.2 years from the beginning of lesions. Maximum number of patients belonged to Fitzpatrick skin type 4 (69.12%) followed by 3 (37.8%), and positive family history among first-degree relatives was seen in 29 patients (31.32%). According to the marital status of the patients, 48 were married whereas 53 were single and seven were divorced. The most prevalent occupational group observed was that of laborers (33.48%) followed by students (32.4%), household workers (24.84%), semi-skilled workers (15.12%), skilled workers (6.48%), and unemployed (4.32%). While 55.08% of patients had both exposed and non-exposed sites involved, 42.12% had lesions on non-exposed sites, and 19.44% on exposed sites only. The involvement of different sites in the study population is depicted in figure 1.

With regards to disease severity, mean VASI score in this study was  $13.26 \pm 9.12$  and higher values were seen in patients with disease duration of  $< 3$  years



**Figure 1.** Involvement of various sites in the study population—scalp (6.48%), face (12.92%), chest (17.59%), abdomen (9.25%), back (13.88%), upper limb (14.81%), lower limb (12.96%), genital (5.55%), and mucosal (6.48%).

( $15.06 \pm 10.86$ ), those who had positive family history among first-degree relatives ( $14.21 \pm 11.48$ ) and were unemployed ( $17.35 \pm 2.26$ ). Similarly, higher VASI scores were demonstrated among patients with skin type V ( $18.67 \pm 12.92$ ), had lesions on the exposed sites ( $14.17 \pm 11.8$ ), and had patches involving the lower limbs ( $17.43 \pm 8.19$ ). Mean VASI scores observed were almost alike in both genders (males:  $13.49 \pm 10.15$ ; females:  $13.02 \pm 8.10$ ). Similarly, nearly equal values of mean VASI were observed in patients of different marital status (divorced:  $13.79 \pm 3.90$ ; single:  $13.09 \pm 9.47$ ; married:  $13.37 \pm 9.48$ ). Of all the above values obtained, none of these was statistically significant (Table 1).

Overall, the mean VitiQoL score of our study population was  $25.71 \pm 14.60$ , with statistically significant lower mean VitiQoL scores observed in males ( $24.53 \pm 10.822$ ) as compared to females ( $29.89 \pm 12.57$ ;  $p = 0.019$ ). Similarly, higher statistically significant VitiQoL scores were observed in the age group of 18-29 years ( $31.64 \pm 18.76$ ;  $p = 0.022$ ), who had lesions on the exposed sites ( $28.94 \pm 12.25$ ;  $p = 0.039$ ) and among divorced patients ( $31.43 \pm 11.60$ ;  $p = 0.019$ ). Higher scores were observed in patients with skin type V ( $33.67 \pm 17.45$ ), had lesions on the face ( $31.36 \pm 21.82$ ), and mucosal lesions ( $29.00 \pm 16.62$ ). The scores were highest in those who were unemployed ( $32.50 \pm 25.56$ ) and laborers ( $28.43 \pm 16.10$ ) as compared to other occupational groups, though not statistically significant (Table 2).

The highest mean VitiQoL score was seen in questions 1 and 9 of the questionnaire while the lowest mean scores were observed in questions 11 and 12. Similarly, the comparison of mean VitiQoL scores among individual

**Table 1.** The correlation of VASI score with various demographic variables

VASI	n	VASI mean	Standard deviation of VASI
Gender			
F	53	13.02264	8.103042
M	55	13.49498	10.151652
Age			
18-29	29	13.35793	10.954816
30-39	23	12.92496	7.639786
40-49	34	11.76794	6.488887
50	22	15.80273	11.403364
Duration of disease			
< 3	46	15.06609	10.869080
3-6	25	12.64800	4.703092
7-12	18	8.33278	5.457519
13-15	7	13.36571	9.308494
> 15	12	14.96950	11.601466
Family history			
Positive	29	14.21034	11.487202
Negative	79	12.91549	8.208034
Marital status			
Divorce	7	13.79429	3.900576
Single	53	13.09566	9.470319
Married	48	13.37071	9.482691
Occupation			
Student	30	10.58347	6.152763
Labour	31	15.70290	9.655232
Household worker	23	13.90391	11.209264
Semiskilled	14	12.09071	4.175003
Skilled	6	11.61000	8.444875
Unemployed	4	17.35250	20.260318
Skin type			
Type III	35	13.12029	8.594867
Type IV	64	12.58006	8.766884
Type V	9	18.67667	12.929084
Sites			
Exposed	18	14.17056	11.800257
Covered	39	13.58615	8.785275
Exposed + covered	51	12.69596	8.543971
Individual sites			
Scalp	7	9.12700	3.541248
Face	14	12.85714	5.145439
Chest	19	13.30158	8.977349
Abdomen	10	17.24286	4.121850
Back	15	14.81067	7.569624
UL	16	9.61900	4.296506
LL	14	17.43571	8.193508
Genital	6	12.82167	7.023351
Mucosal	7	12.94714	7.334989

VASI: vitiligo area severity index.

domains of the questionnaire demonstrated higher values among “limited social participation” and “stigma” domain in the female gender and in the patients aged 18-29 years, while higher values among the questions

pertaining to the “behaviour” domain were observed in patients with skin type V and in those who had lesions on the exposed sites (Table 3).

Figure 2 demonstrates the correlation of VASI score ( $13.26 \pm 9.12$ ) with VitiQoL score ( $25.71 \pm 14.60$ ) in which a very strong correlation was found between the two scores ( $r = 0.856$  and  $p < 0.001$ ).

## Discussion

As a consequence of the high prevalence of vitiligo among various global races and the social stigma attached with it even among people of high economic status, there is an overwhelming impact on QoL and psychosocial component in the patients suffering from the disease. Despite the fact that India has the highest prevalence of the disease, there is a paucity of studies on the association of QoL indicators in vitiligo with disease activity and area scores in Indian patients<sup>15</sup>. In this particular study, though there was no significant difference among the mean VASI scores between males and females, the mean VitiQoL scores were significantly higher among females as compared to males, statistically ( $p < 0.05$ ). This is similar to an earlier study done by Hedayat et al.<sup>13</sup> thereby implicating that the disease has more influence on the QoL in females. However, it is in contrast to previous studies which demonstrated that the psychological impact of the disease remains the same irrespective of the gender<sup>16-18</sup>. This contradiction can be attributed to the cultural variations among individuals belonging to different regions in which the studies were carried out.

Similarly, other demographic variables that demonstrated such statistically significant higher VitiQoL scores, and thus, poor QoL due to vitiligo, were individuals in the age group of 18-29 years, divorced patients, and those who had patches on the exposed body parts. All these before mentioned results were consistent with studies done prior on QoL in vitiligo using other scores<sup>7,8,14,19</sup>.

The appearance of patches has been reported as grounds for divorce in many individuals as in our study<sup>20,21</sup>. Contrarily, in a study, conducted by in Saudi<sup>22</sup>, the QoL of married people was affected as much as that of single individuals. This difference could be explained by the firm and false belief about the contagious nature of the disease in developing countries like India due to lack of education. This fact is further supported by the higher values of VitiQoL score obtained in unemployed patients and laborers as

**Table 2.** The correlation of vitiligo quality of life score with various demographic variables

VitiQoL	n	VitiQoL mean	Standard deviation of VitiQoL	p-value
Gender				
F	53	25.53	13.827	0.899
M	55	25.89	15.576	
Age				
18-29	29	25.52	16.311	0.181
30-39	23	23.87	12.282	
40-49	34	23.29	10.777	
> 50	22	31.64	18.766	
Duration of disease				
< 3	46	28.39	16.420	0.104
3-6	25	24.40	12.261	
7-12	18	18.06	8.235	
13-15	7	25.29	18.373	
> 15	12	29.92	15.030	
Family history				
Positive	29	26.45	16.832	0.754
Negative	79	25.44	13.910	
Marital status				
Divorce	7	29.43	11.603	0.762
Single	53	25.83	15.188	
Married	48	25.04	14.677	
Occupation				
Student	30	22.90	12.775	0.485
Labour	31	28.32	16.109	
Household worker	23	27.17	17.536	
Semiskilled	14	24.50	7.003	
Skilled	6	19.00	6.197	
Unemployed	4	32.50	25.567	
Skin type				
Type III	35	26.31	16.403	0.191
Type IV	64	24.27	13.061	
Type V	9	33.67	17.450	
Sites				
Exposed	18	25.94	17.254	0.983
Covered	39	25.97	15.399	
Exposed + covered	51	25.43	13.391	
Individual sites				
Scalp	7	27.14	20.416	0.192
Face	14	31.36	21.823	
Chest	19	28.00	14.380	
Abdomen	10	20.10	9.386	
Back	15	28.00	13.867	
UL	16	18.25	5.859	
LL	14	28.14	13.917	
Genital	6	17.67	3.615	
Mucosal	7	29.00	16.623	

VitiQoL: vitiligo quality of life.

compared to skilled individuals, though not statistically significant.

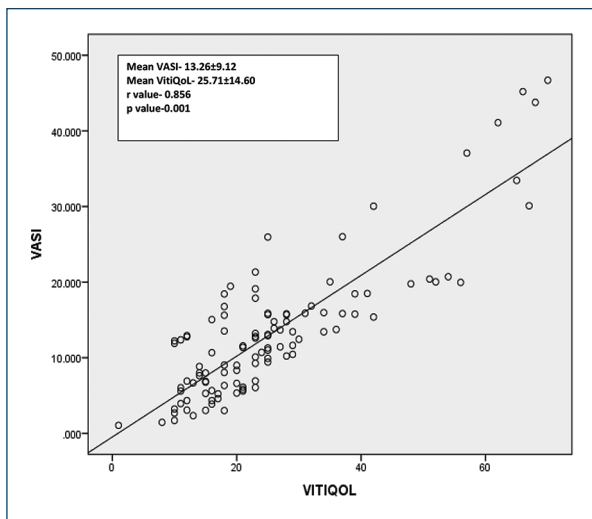
Overall, the mean VitiQoL scores were higher in questions 1 and 9, and lowest in questions 11 and 12 of the questionnaire, thereby indicating the fear of facing the society due to massive psychological impact on the

diseased individuals. Among individual domains of VitiQoL questionnaire, the females and patients aged 18-29 years were found to have more limited social participation and stigma associated with the disease. On the other hand, the behavior domain was more affected in individuals who had skin type V and those having lesions

**Table 3.** The effect of various variables on individual domains of vitiligo quality of life questionnaire

Variables	Limited social participation		Stigma		Behavior	
	Mean	SD	Mean	SD	Mean	SD
Sex						
Male	3.58	1.72	4.63	1.36	3.95	1.91
Female	4.12	1.41	4.96	1.28	3.29	1.40
Age						
18-29	3.17	1.23	4.12	1.75	3.11	2.03
30-39	2.83	1.84	3.90	1.97	2.74	1.06
40-49	2.42	2.92	3.47	1.03	3.29	1.73
> 50	2.85	1.05	3.92	1.39	3.30	1.29
Skin colour						
III	3.68	2.95	2.83	1.95	3.15	2.01
IV	3.03	2.04	2.85	2.53	3.92	2.28
V	3.62	1.94	2.79	1.73	4.13	1.53
Patches exposure						
Exposed	3.72	1.92	2.90	1.39	3.60	1.74
Non-exposed	3.38	1.06	3.15	1.03	3.14	1.05
Both	3.94	2.02	3.07	1.86	3.36	1.96

SD: standard deviation.



**Figure 2.** Scatter plot demonstrating the correlation between vitiligo area severity index score and vitiligo quality of life score; association of the parameters is shown by solid line ( $p = 0.001$ ;  $r = 0.856$ ).

on the exposed sites only. It is worth mentioning that the present study's greater participation limitation scores contradict the majority of previous researches<sup>13,19,23</sup>. This disparity in participation limitation might be due to increased aesthetic expectations from women and those in the young age, which make these individuals unable to carry out day-to-day and recreational endeavors as freely as other individuals due to the superstitions associated with

the disease. This inability to interact with others leads to solitude, overthinking, concern, embarrassment, and humiliation which adds to the stigma associated with the disease. In a similar manner, this relatively poor QoL in skin Type V and in the individuals having lesions on the exposed sites can be explained by the societal pressure of age old beauty standards that forces these affected persons to resort to techniques of camouflage to hide their patches, which in turn, leads to emotional breakdown and behavioral alterations<sup>13,19,23-25</sup>.

Furthermore, in the present study, it was observed that VitiQoL score had a statistically significant strong correlation with VASI score ( $p < 0.001$ ,  $r = 0.856$ ), which strikingly implies that higher the disease severity, more the impact on QoL. Several studies done before the present study have demonstrated this association of QoL scores with area severity scores<sup>10,13,16,17</sup> but none of this showed such a remarkably strong correlation between these two variables.

### Limitations

The study was a based on the questionnaire and did not include any control group. Another limitation of the study is the lack of psychiatric evaluation, such as inclusion of anxiety and depression scores. Moreover, it was conducted in a hospital and hence, extrapolating this data to the community level may not be reflective of the real burden of the disease.

## Conclusion

Despite several limitations, our study demonstrated association of the body surface area score (VASI) of vitiligo with disease-specific QoL score (VitiQoL). The study highlights the efficacy and superiority of vitiligo-specific QoL measures over previous scores which lacked disease-specific parameters, thereby emphasizing the importance of assessment and timely screening of patients of vitiligo for psychological impairment with the help of such questionnaires as it as essential part of disease management.

## Supplementary data

Supplementary data are available at DOI: 10.24875/PJDV.23000066. These data are provided by the corresponding author and published online for the benefit of the reader. The contents of supplementary data are the sole responsibility of the authors.

## Funding

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## Conflicts of interest

None.

## Ethical disclosures

**Protection of human and animal subjects.** The authors declare that no experiments were performed on humans or animals for this study.

**Confidentiality of data.** The authors declare that no patient data appear in this article.

**Right to privacy and informed consent.** The authors declare that no patient data appear in this article.

**Use of artificial intelligence for generating text.** The authors declare that they have not used any type of generative artificial intelligence for the writing of this manuscript nor for the creation of images, graphics, tables, or their corresponding captions.

## References

1. Lapeere H, Boone B, De Schepper S, Verhaeghe E, Van Geel M, Onogene K, et al. Hypomelanoses and hypermelanoses. In: Freedberg IM, Eisen AZ, Wolff K, Austen KF, Goldsmith LA, Katz SI, editors. *Fitzpatrick's Dermatology in General Medicine*. 6<sup>th</sup> ed. New York, USA: McGraw-Hill; 2003. p. 839-46.
2. Rashighi M, Harris JE. Vitiligo pathogenesis and emerging treatments. *Dermatol Clin*. 2017;35:257-65.
3. Mosher DB, Fitzpatrick TB, Ortonne JP, Hori Y. Hypomelanosis and hypermelanosis. In: Freedberg IM, Eisen Z, Wolff, K, Austen KF, Goldsmith LA, Katz SI, et al, editors. *Fitzpatrick's Dermatology in General Medicine*. 5<sup>th</sup> ed. New York, USA: McGraw-Hill; 1999. p. 949.
4. Malhotra N, Dytoc M. The pathogenesis of vitiligo. *J Cutan Med Surg*. 2013;17:153-72.
5. Njoo MD, Westerhof W. Vitiligo. Pathogenesis and treatment. *Am J Clin Dermatol*. 2001;2:167-81.
6. Hamzavi I, Jain H, McLean D, Shapiro J, Zeng H, Lui H. Parametric modeling of narrowband UV-B phototherapy for vitiligo using a novel quantitative tool: the vitiligo area scoring index. *Arch Dermatol*. 2004;140:677-83.
7. Parsad D, Dogra S, Kanwar AJ. Quality of life in patients with vitiligo. *Health Qual Life Outcomes*. 2003;1:58.
8. Mattoo SK, Handa S, Kaur I, Gupta N, Malhotra R. Psychiatric morbidity in vitiligo: prevalence and correlates in India. *J Eur Acad Dermatol Venereol*. 2002;16:573-8.
9. Porter JR, Beuf AH, Lerner A, Nordlund J. Psychosocial effect of vitiligo: a comparison of vitiligo patients with "normal" control subjects, with psoriasis patients, and with patients with other pigmentary disorders. *J Am Acad Dermatol*. 1986;15:220-4.
10. Wang KY, Wang KH, Zhang ZP. Health-related quality of life and marital quality of vitiligo patients in China. *J Eur Acad Dermatol Venereol*. 2011;25:429-35.
11. Talsania N, Lamb B, Bewley A. Vitiligo is more than skin deep: a survey of members of the vitiligo society. *Clin Exp Dermatol*. 2010;35:736-9.
12. Kent G, Al-Abadie M. Factors affecting responses on dermatology life quality index items among vitiligo sufferers. *Clin Exp Dermatol*. 1996;21:330-3.
13. Hedayat K, Karbakhsh M, Ghiasi M, Goodarzi A, Fakour Y, Akbari Z, et al. Quality of life in patients with vitiligo: a cross-sectional study based on vitiligo quality of life index (VitiQoL). *Health Qual Life Outcomes*. 2016;14:86.
14. Lilly E, Lu PD, Borovicka JH, Victorson D, Kwasny MJ, West DP, et al. Development and validation of a vitiligo-specific quality-of-life instrument (VitiQoL). *J Am Acad Dermatol*. 2013;69:e11-8.
15. Agarwal S, Jain C, Shaafie HI, Khalid A, Singh A. Impact on quality of life of family members of vitiligo patients in North India: a cross-sectional study using family dermatology life quality index. *Indian J Dermatol Venereol Leprol*. 2021;87:869-72.
16. Patvekar MA, Deo KS, Verma S, Kothari P, Gupta A. Quality of life in vitiligo: relationship to clinical severity and demographic data. *Pigment Int*. 2017;4:104-8.
17. Kota RS, Vora RV, Varma JR, Kota SK, Patel TM, Ganjiwale J. Study on assessment of quality of life and depression in patients of vitiligo. *Indian Dermatol Online J*. 2019;10:153-7.
18. Aghaei S, Sodaifi M, Jafari P, Mazharinia N, Finlay AY. DLQI scores in vitiligo: reliability and validity of the persian version. *BMC Dermatol*. 2004;4:8.
19. Dolatshahi M, Ghazi P, Feizy V, Hemami MR. Life quality assessment among patients with vitiligo: comparison of married and single patients in Iran. *Indian J Dermatol Venereol Leprol*. 2008;74:700.
20. Radtke MA, Schäfer I, Gajur A, Langenbruch A, Augustin M. Willingness-to-pay and quality of life in patients with vitiligo. *Br J Dermatol*. 2009;161:134-9.
21. Alikhan A, Felsten LM, Daly M, Petronic-Rosic V. Vitiligo: a comprehensive overview Part I. Introduction, epidemiology, quality of life, diagnosis, differential diagnosis, associations, histopathology, etiology, and work-up. *J Am Acad Dermatol*. 2011;65:473-91.
22. Al-Mubarak L, Al-Mohanna H, Al-Issa A, Jabak M, Mulekar SV. Quality of life in Saudi vitiligo patients. *J Cutan Aesthet Surg*. 2011;4:33-7.
23. Do Bú, Emerson & Alexandre, Maria & Santos, Vitória. (2021). Quality of Life of People with Vitiligo: A Brazilian Exploratory Study. *Revista de Psicologia da IMED*. 13. 264-283. 10.18256/2175-5027.2021.v13i1.4236.
24. Do Bú EA, De Alexandre ME, Scardua A, de Araújo CR. Vitiligo as a psychosocial disease: apprehensions of patients imprinted by the white. *Interface Comun Saúde Educ*. 2018;22:481-91.
25. Simons RE, Zevy DL, Jafferany M. Psychodermatology of vitiligo: psychological impact and consequences. *Dermatol Ther*. 2020;33:e13418.